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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Bernhard Erich Hermann Claus et al.	§ §	Group Art Unit: 2625
Serial No.: 09/976,621	§ § §	Examiner: Chen, Wenpeng
Filed: October 12, 2001	§ §	
For: RECONSTRUCTION METHODS FOR TOMOSYNTHESIS	§ §	Atty. Docket: RD28415-1/YOD GERD:0214

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June 19, 2006	Lynda Howell
Date	Lynda Howell

APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.31 AND 41.37

This Appeal Brief is being filed in furtherance to the Notice of Appeal mailed on February 28, 2006, and received by the Patent Office on March 6, 2006.

The Commissioner is authorized to charge the requisite fee of $500.00, and any additional fees which may be necessary to advance prosecution of the present application, to Deposit Account No. 07-0868, Order No. RD28415-1/YOD (GERD:0214).

Appellants hereby request a two (2) month extension in the statutory period for submission of the Appeal Brief, from May 6, 2006 to July 6, 2006, in accordance with 37 C.F.R. § 1.136. The Commissioner is authorized to charge the requisite fee of $450.00, and any other fee that may be required, to Deposit Account No. 07-0868; Order No. RD28415-1/YOD (GERD:0214).

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1. REAL PARTY IN INTEREST

The real party in interest is General Electric Company, the Assignee of the above-referenced application by virtue of the Assignment to General Electric Company by Bernhard Erich Hermann Claus and Jeffrey Wayne Eberhard recorded at reel 012575, frame 0450, and dated February 1, 2002. Accordingly, General Electric Company, as the parent company of the Assignee of the above-referenced application, will be directly affected by the Board's decision in the pending appeal.

2. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is Appellants' legal representative in this Appeal.

3. STATUS OF CLAIMS

Claims 1-3, 13-16, 26-29 and 39 are currently pending, are currently under final rejection and, thus, are the subject of this Appeal.

4. STATUS OF AMENDMENTS

The Appellants have not submitted any amendments subsequent to the Final Office Action mailed on January 28, 2006. Consequently, there are no outstanding amendments to be considered by the Board.

5. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates generally to a tomosynthesis system. *See* Application, page 1, paragraph 001. More particularly, in certain embodiments, the invention relates to reconstruction methods producing images in tomosynthesis systems. *See id.*

The Application contains five independent claims, namely, claims 1, 13, 14, 26, 27 and 39, all of which are the subject of this Appeal. The subject matter of these claims is summarized below.

With regard to the aspect of the invention set forth in independent claim 1, discussions of the recited features of claim 1 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a method (*e.g.*, 60) for reconstructing three-dimensional dataset representative of an imaged object (*e.g.*, 12). The method (*e.g.*, 60) includes acquiring views (*e.g.*, 62) of an object (*e.g.*, 12) from at least two projection angles (*e.g.*, 18) via an imaging system (*e.g.*, 10). *See, e.g., id.* at pages 5-6, paragraph 0016; *see also* FIG. 2. The imaging system (*e.g.*, 10) includes at least one radiation source (*e.g.*, 14) and at least one detector array (*e.g.*, 16) to generate a projection dataset of the object (*e.g.*, 12). *See, e.g., id.* at pages 3-4, paragraph 0010; *see also* FIG. 1. The method (*e.g.*, 60) further includes backprojecting the views (*e.g.*, 64) across an imaged volume to generate backprojected data and processing the backprojected data (*e.g.*, 66) using a non-linear operator (*e.g.*, 68) to generate a three-dimensional dataset consisting of a plurality of images representative of the imaged object (*e.g.*, 12). *See, e.g., id.* at pages 5-6, paragraph 0016; *see also* FIG. 2.

With regard to the aspect of the invention set forth in independent claim 13, discussions of the recited features of claim 13 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a method (*e.g.*, 60) for reconstructing three-dimensional dataset representative of an imaged object (*e.g.*, 12). The method (*e.g.*, 60) includes acquiring views (*e.g.*, 62) of an object (*e.g.*, 12) from at least two projection angles (*e.g.*, 18) via a medical imaging system (*e.g.*, 10). *See, e.g., id.* at pages 5-6, paragraph 0016; *see also* FIG. 2. The medical imaging system (*e.g.*, 10) includes at least one radiation source (*e.g.*, 14) and at least one detector array (*e.g.*, 16) to generate projection data of the object (*e.g.*, 12). The at least one detector array (*e.g.*, 16) includes one of a computed tomography (CT) detector array, a chest detector array and a mammographic detector array. *See, e.g., id.* at pages 3-4, paragraph 0010; *see also* FIG. 1. The method (*e.g.*, 60) further includes backprojecting the views (*e.g.*, 64) across an imaged volume to generate backprojected data and processing the backprojected data

(*e.g.*, 66) using a non-linear operator (*e.g.*, 68) to generate a three-dimensional dataset consisting of a plurality of images representative of the imaged object (*e.g.*, 12). *See, e.g., id.* at pages 5-6, paragraph 0016; *see also* FIG. 2. The non-linear operator (*e.g.*, 68) comprises one of a maximum operator (*e.g.*, 70), a minimum operator (*e.g.*, 72), a generalized average operator (*e.g.*, 76), a binary operator (*e.g.*, 78), a monotonic operator (*e.g.*, 80), a median operator (*e.g.*, 74) according to $f(P_1,...,P_N) = median(P_1,...,P_N) = Q_{\frac{(N+1)}{2}}$, and a generalized median operator (*e.g.*, 74) according to $f(P_1,...,P_N) = Q_K$ for some fixed value K wherein $1 \leq K \leq N$. *See, e.g., id.* at pages 6-10, paragraphs 0018-0028; *see also* FIG. 3. *See, also, id.* at pages 10-12, paragraphs 0029-0033.

With regard to the aspect of the invention set forth in independent claim 14, discussions of the recited features of claim 14 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a medical imaging system (*e.g.*, 10) for reconstructing a three-dimensional dataset representative of an imaged object (*e.g.*, 12). The medical imaging system (*e.g.*, 10) includes a detector array (*e.g.*, 16) and at least one radiation source (*e.g.*, 14). *See, e.g., id.* at pages 3-4, paragraph 0010; *see also* FIG. 1. The medical imaging system (*e.g.*, 10) further includes a computer (*e.g.*, 38) coupled to the detector array (*e.g.*, 16) and the radiation source (*e.g.*, 14) and configured to acquire views (*e.g.*, 62) of an object (*e.g.*, 12) from at least two projection angles (*e.g.*, 18) to generate projection data of the object (*e.g.*, 12), to backproject the views (*e.g.*, 64) across an imaged volume to generate backprojected data, and to process the backprojected data (*e.g.*, 66) using a non-linear operator (*e.g.*, 68) to generate a three-dimensional dataset consisting of a plurality of medical images representative of the imaged object (*e.g.*, 12). *See, e.g., id.* at pages 4-5, paragraphs 0013-0015; FIG. 1; pages 5-6, paragraph 0016; FIG. 2.

E.G. 1st line (TO?)

With regard to the aspect of the invention set forth in independent claim 26, discussions of the recited features of claim 26 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a medical imaging system (e.g., 10) for reconstructing a three-dimensional dataset representative of an imaged object (e.g., 12). The medical imaging system (e.g., 10) includes a detector array (e.g., 16) and at least one radiation source (e.g., 14). The detector array (e.g., 16) includes one of a computed tomography (CT) detector array, a chest detector array and a mammographic detector array. *See, e.g., id.* at pages 3-4, paragraph 0010; *see also* FIG. 1. The imaging system (e.g., 10) further includes a computer (e.g., 38) coupled to the detector array (e.g., 16) and the radiation source (e.g., 14) and configured to acquire views (e.g., 62) of an object (e.g., 12) from at least two projection angles (e.g., 18) to generate projection data of the object (e.g., 12), to backproject the views (e.g., 64) across the imaged volume to generate backprojected data, and to process the backprojected data (e.g., 66) using a non-linear operator (e.g., 68) to generate a three-dimensional dataset consisting of a plurality of medical images representative of the imaged object (e.g., 10). *See, e.g., id.* at pages 4-5, paragraphs 0013-0015; FIG. 1; at pages 5-6, paragraph 0016; FIG. 2. The non-linear operator (e.g., 68) comprises one of a maximum operator (e.g., 70), a minimum operator (e.g., 72), a generalized average operator (e.g., 76), a binary operator (e.g., 78), a monotonic operator (e.g., 80), a median operator (e.g., 74) according to $f(P_1,\ldots,P_N) = median(P_1,\ldots,P_N) = Q_{\frac{(N+1)}{2}}$, and a generalized median operator (*e.g.*, 74) according to $f(P_1,\ldots,P_N) = Q_K$ for some fixed value K wherein $1 \leq K \leq N$. *See, e.g., id.* at pages 6-10, paragraphs 0018-0028; FIG. 3; pages 10-12, paragraphs 0029-0033.

With regard to the aspect of the invention set forth in independent claim 27, discussions of the recited features of claim 27 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a computer readable medium encoded with a program executable by a computer (*e.g.*, 38) for reconstructing a three-

dimensional dataset representative of an imaged object (*e.g.*, 12). *See, e.g., id.* at pages 4-5, paragraphs 0013-0015; *see also* FIG. 1. The program is configured to instruct the computer (*e.g.*, 38) to acquire views (*e.g.*, 62) of an object (*e.g.*, 12) from at least two projection angles (*e.g.*, 18) to generate projection data of the object (*e.g.*, 12), to backproject the views (*e.g.*, 64) across an imaged volume to generate backprojected data, and to process the backprojected data (*e.g.*, 66) using a non-linear operator (*e.g.*, 68) to generate a three-dimensional dataset consisting of a plurality of medical images representative of the imaged object (*e.g.*, 12). *See, e.g., id.* at pages 5-6, paragraph 0016; *see also* FIG. 2.

With regard to the aspect of the invention set forth in independent claim 39, discussions of the recited features of claim 39 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a computer readable medium encoded with a program executable by a computer (*e.g.*, 38) for reconstructing a three-dimensional radiographic image. *See, e.g., id.* at pages 4-5, paragraphs 0013-0015; *see also* FIG. 1. The program is configured to instruct the computer (*e.g.*, 38) to acquire views (*e.g.*, 62) of an object (*e.g.*, 12) from at least two projection angles (*e.g.*, 18) to generate projection data via one of a computed tomography (CT) detector array (*e.g.*, 16), chest detector array (*e.g.*, 16), and a mammographic detector array (*e.g.*, 16). The program is further configured to instruct the computer (*e.g.*, 38) to backproject the views (*e.g.*, 64) across an imaged volume to generate backprojected data, and to process the backprojected data (*e.g.*, 66) using a non-linear operator (*e.g.*, 68) to generate a three-dimensional dataset consisting of a plurality of medical images representative of the imaged object (*e.g.*, 12). *See, e.g., id.* at pages 5-6, paragraph 0016; *see also* FIG. 2. The non-linear operator (*e.g.*, 68) includes one of a maximum operator (*e.g.*, 70), a minimum operator (*e.g.*, 72), an average operator (*e.g.*, 76), a binary operator (*e.g.*, 78), a monotonic operator (*e.g.*, 80), a median operator (*e.g.*, 74) according to $f(P_1,\ldots,P_N) = median(P_1,\ldots,P_N) = Q_{\frac{(N+1)}{2}}$, and a generalized median operator (*e.g.*, 74)

according to $f(P_1,...,P_N) = Q_K$ for some fixed value K wherein $1 \leq K \leq N$. *See, e.g., id.* at pages 6-10, paragraphs 0018-0028; FIG. 3; pages 10-12, paragraphs 0029-0033.

A benefit of the invention, as recited in these claims, is the use of a non-linear operator (*e.g.*, 68) to facilitate an improvement in image quality and diagnostic value in procedures such as chest tomosynthesis. In chest tomosynthesis, the ribs, in particular, are high-contrast structures that interfere with the visibility of other structures, such as lung nodules, for the detection of lung cancer. Tomosynthesis in combination with non-linear operator (*e.g.*, 68) facilitates a reduction in image reconstruction artifacts generated by the ribs. In breast imaging, the non-linear operator (*e.g.*, 68) facilitates a reduction in streak artifacts in the reconstructed three-dimensional dataset because a high-contrast calcification may be reproduced in standard simple backprojection as a plurality of low-contrast copies at any slice at an incorrect location in the imaged volume. Further, high contrast imaging markers may be used to allow for correction of inaccuracies in the imaging geometry during acquisition (*e.g.*, 62) of views. For example, a plurality of imaging markers is placed within the imaged volume prior to being scanned to facilitate reconstruction of the specific geometry from the acquired projection images. The non-linear operator facilitates a reduction in the artifacts generated by the imaging markers. *See, e.g., id.* at page 6, paragraph 0017.

Additionally, performing non-linear reconstruction of the whole imaged volume generates a three-dimensional dataset with a low level of artifacts from very high gray level value or very low gray level value structures within the imaged object. In one embodiment, for example, very high gray level values of a pixel in a view are discarded in the reconstruction of many slices, and the average gray level value of the reconstructed three-dimensional dataset at the corresponding locations in all slices is much smaller than the pixel value in the view. The enhancement of the reconstructed three-dimensional dataset using the cumulative unused contrast as well as the number of slices where that

pixel did contribute to the reconstruction, minimizes this inconsistency. *See, e.g., id.* at pages 10-12, paragraphs 0029-0033.

This is a clear difference and distinction from the prior art, as discussed below.

6. <u>GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL</u>

<u>First Ground of Rejection for Review on Appeal</u>:

Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claims 1-3, 13-16, and 26 under 35 U.S.C. § 102(b) as being anticipated by Webber, U.S. Patent No. 6,081,577 (hereinafter "Webber").

<u>Second Ground of Rejection for Review on Appeal</u>:

The Examiner rejected claims 27-29, and 39 under 35 U.S.C. § 103(a) as being unpatentable over Webber in view of Stanton et al., U.S. Patent No. 6,744,848 (hereinafter "Stanton"). Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection.

7. <u>ARGUMENT</u>

As discussed in detail below, the Examiner has improperly rejected the pending claims. Further, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under Sections 102 and 103. Accordingly, Appellants respectfully request full and favorable consideration by the Board, and reversal of the outstanding rejections. Appellants strongly believe that claims 1, 13, 14, 26, 27 and 39 are currently in condition for allowance.

A. <u>Ground of Rejection No. 1</u>:

The Examiner rejected claims 1-3, 13-16, and 26 under 35 U.S.C. § 102(b) as being anticipated by Webber.

Claims 1, 13, 14 and 26 and the Claims Depending Therefrom.

The Examiner rejected each of the independent claims 1, 13, 14, and 26 under 35 U.S.C. §102(b) as being anticipated by Webber. Anticipation under 35 U.S.C. § 102 requires a showing that each limitation of a claim is found in a single reference, practice or device. In re Donohue, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985). Appellants respectfully assert that the present invention, as recited in independent claims 1, 13, 14 and 26 is patentable over the Webber reference.

Appellants' position with respect to the Webber reference can be summarized as follows. Independent claims 1, 13, 14 and 26 recite, in generally similar language, *acquiring views of an object from at least two projection angles to generate projection datas of the object, backprojecting the views across an imaged volume to generate backprojected data, and processing the backprojected data using a non-linear operator to generate a three-dimensional dataset consisting of a plurality of images representative of the imaged object.* All the claims require ***the backprojected data to be processed using a non-linear operator.***

Webber discloses using a non-linear operator *but never in combination with backprojection operation.* In other words, Webber discloses using *either* backprojection (linear tomosynthesis) *or* minimization (non-linear tomosynthesis) *but not both.* Webber states that,

> [w]hen a linear combination (backprojection) of the first and second data images is performed, the image intensity at the same relative position of both data images is averaged. For example, relative position B in one data image corresponds to relative position E in the other data image and, therefore, the corresponding relative position in the tomosynthetic image is assigned an intensity equal to the average of the intensity measured at relative position B and relative position E (i.e., (B+E)/2. As a result, the tomosynthetic image 1150 is marked by a blurring of the image produced by the first radiopaque object 1140. However, when a non-linear combination of the first and second data images is performed, both data images are compared and, for example, only the minimum intensity at

> each relative position is retained. For example, relative position B in one data image corresponds to relative position E in the other data image and, therefore, the corresponding relative position in the tomosynthetic image is assigned an intensity equal to the lesser of the intensities measured at relative position B and relative position E (i.e., B or E). As a result, the blurring shadows are eliminated from the tomosynthetic image 1152. Webber, column 22, lines 9-47; *see also*, FIG. 24(a) and (b).

Clearly, Webber discloses two different techniques for generating a tomosynthesis image. When the non-linear operation is performed, it is *not* on the backprojected data. As described in Webber, the non-linear operation (minimization) is preferred over the linear operation (backprojection) as the non-linear operation reduces blurring artifacts. *See, id.,* column 22, line 48 – column 23, line 19.

Appellants respectfully assert that *there is no teaching or suggestion that the backprojected data are being further processed via a non-linear operator as claimed in the present application.* In fact, Webber teaches that one skilled in the art may not need a backprojection technique at all and may just rely on the non-linear combination of the projection images to generate a tomosynthesis image for diagnosis. *See*, *id.,* column 28, lines 14-31. Specifically, Webber states that

> [t]his approach is very efficient: it is simpler to implement than conventional tomosynthetic back-projection methods; and it produces sharp-appearing images that do not require additional computationally intensive inverse filtering or interative deconvolution schemes. *Id.*, column 28, lines 20-24.

In contrast, the claimed processing uses a backprojection technique on the acquired projection images to generate backprojected data. The backprojected data is further processed via a non-linear operator to generate a three-dimensional dataset representative of the imaged object.

In the Final Office Action, the Examiner incorrectly summarized Appellants' position with the statement: "[a]s described in Webber, the non-linear combination

(minimization) is preferred over linear combination (backprojection) as the non-linear combination reduces blurring artifacts". However, Appellants submit that the Examiner has over-simplified and mischaracterized the Appellants' position. The Appellants respectfully assert that, in Webber, the non-linear operation used without backprojected data is preferred over the linear operation (ordinary backprojection).

The Examiner further misread and misapplied the Webber reference. The Examiner stated that "Webber teaches in Fig. 24B generating backprojected data from elements 1146 and 1148 into their corresponding addresses or locations. The backprojected data are then processed with a non-linear operator to generate a 3D dataset." The Examiner's misunderstanding is clear from the statements in Advisory Action. There the Examiner stated that "in FIG. 24B of Webber, to find the points C and F corresponding to point 1140 is a backprojection process. The selection of either C or F to form the point in 1152 is the non-linear operator".

However, the Appellants respectfully submit that, as noted above, Fig. 24B of Webber does not teach backprojection at all. *Points C and F are merely projections of point 1140 when irradiated from two different source positions 1144 to produce two distinct radiographic data images 1146 and 1148. See, id.,* column 22, lines 17-26. Appellants respectfully assert that there is no reconstruction involved in generating points C or F in the Webber reference. Additionally, the Appellants respectfully submit that, Fig. 24 B only illustrates or teaches using a non-linear operator (minimization) on an image dataset. The value of the operation "minimum of (A or B)" noted in Fig. 24B (a non-linear operation) is not same as the value of the operation "(A+B)/2" noted in Fig. 24A (which is clearly a linear operation).

The Examiner inconsistently but correctly stated in the Final Office Action that the Webber reference does not teach processing the image dataset (resulting from projection images) with a linear operator and then further processing the linear-operated results with another non-linear operator. *See,* Final Office Action, page 3. This

statement clearly brings out the distintion between Webber and the present Application. *The present invention as recited in all of the independent claims begins with backprojecting the image dataset to generate backprojected data and then processing the backprojected data using a non-linear operator to generate a three-dimensional dataset.*

At least because *Webber does not disclose or suggest a technique that involves processing the backprojected data using a non-linear operator,* as claimed, the reference cannot anticipate claims 1, 13, 14 or 26. Claims 2-3 and 15-16 depend directly or indirectly from claims 1 and 14 respectively. Accordingly, the Appellants submit that claims 2-3 and 15-16 are allowable by virtue of their dependency from an allowable base claim. Appellants also submit that the dependent claims are further allowable by virtue of the subject matter they separately recite. Thus, it is respectfully requested that the rejections of claims 1-3, 13-16 and 26 under 35 U.S.C. §102(b) be reversed.

B. **Ground of Rejection No. 2:**

The Examiner rejected claims 27-29 and 39 under 35 U.S.C. § 103(a) as being unpatentable over Webber in view of Stanton. Appellants respectfully traverse this rejection.

Claims 27 and 39 and the Claims Depending Therefrom.

The Examiner rejected each of the independent claims 27 and 39 under 35 U.S.C. §103(a) as being unpatentable over Webber in view of Stanton. Appellants respectfully traverse this rejection. The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have

found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985).

Contrary to the cited caselaw, the Examiner failed to apply combinations of references that include *all* of the recited features of claims 27 and 39. Independent claims 27 and 39 include similar recitations as claims 1, 13, 14 and 26 and require *the backprojected data to be processed using a non-linear operator*. At least because Webber, as discussed above, fails to teach or suggest processing the backprojected data using a non-linear operator, and as none of the remaining references were argued to do so, Appellants submit that a *prima facie* case of obviousness is not supported against claims 27-29 and 39 for rejection under 35 U.S.C. §103(a). Thus, it is respectfully requested that the rejections of claims 27-29 and 39 under 35 U.S.C. §103(a) be reversed.

Conclusion

Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: 6/19/2006

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8. APPENDIX OF CLAIMS ON APPEAL

Listing of Claims:

1. (previously presented) A method for reconstructing a three-dimensional dataset representative of an imaged object, said method comprising:

acquiring views of an object from at least two projection angles with an imaging system including at least one radiation source and at least one detector array to generate a projection dataset of the object;

backprojecting the views across an imaged volume to generate backprojected data; and

processing the backprojected data using a non-linear operator to generate a three-dimensional dataset consisting of a plurality of images representative of the imaged object.

2. (original) A method in accordance with Claim 1, wherein acquiring views of an object from at least two projection angles with an imaging system comprises acquiring views of an object with one of a computed tomography (CT) detector array, a mammographic detector array, and a chest detector array.

3. (original) A method in accordance with Claim 1 wherein processing the backprojected data using a non-linear operator comprises processing the backprojected data using a maximum operator.

4. (withdrawn) A method in accordance with Claim 1 wherein processing the backprojected data using a non-linear operator comprises processing the backprojected data using a minimum operator.

5. (withdrawn) A method in accordance with Claim 1 wherein processing the backprojected data using a non-linear operator comprises processing the

backprojected data using a median operator according to
$f(P_1,...,P_N) = median(P_1,...,P_N) = Q_{\frac{(N+1)}{2}}$.

6. (withdrawn) A method in accordance with Claim 1 wherein processing the backprojected data using a non-linear operator comprises processing the backprojected data using a generalized median operator wherein said generalized median operator comprises $f(P_1,...,P_N) = Q_K$ for some fixed value K wherein $1 \leq K \leq N$.

7. (withdrawn) A method in accordance with Claim 1 wherein processing the backprojected data using a non-linear operator comprises processing the backprojected data using a generalized average operator.

8. (withdrawn) A method in accordance with Claim 1 wherein processing the backprojected data using a non-linear operator comprises processing the backprojected data using a binary operator.

9. (withdrawn) A method in accordance with Claim 1 wherein processing the backprojected data using a non-linear operator comprises processing the backprojected data using a monotonic operator.

10. (withdrawn) A method according to Claim 1 further comprising enhancing the generated three-dimensional dataset using unused contrast.

11. (withdrawn) A method in accordance with Claim 10, wherein to enhance the generated three-dimensional dataset said method further comprising performing a nonlinear reconstruction using enhanced views.

12. (withdrawn) A method in accordance with Claim 11, wherein said method further comprising computing enhanced views from the original views using unused contrast and a contribution count.

13. (previously presented) A method for reconstructing a three-dimensional dataset representative of an imaged object, said method comprising:

acquiring views of an object from at least two projection angles with a medical imaging system including at least one radiation source and at least one detector array to generate projection data of the object, wherein said at least one detector array comprises one of a computed tomography (CT) detector array, a chest detector array and a mammographic detector array.

backprojecting the views across an imaged volume to generate backprojected data; and

processing the backprojected data using a non-linear operator to generate a three-dimensional dataset consisting of a plurality of medical images representative of the imaged object, wherein said non-linear operator comprises one of a maximum operator, a minimum operator, a generalized average operator, a binary operator, a monotonic operator, a median operator according to $f(P_1,...,P_N) = median(P_1,...,P_N) = Q_{\frac{(N+1)}{2}}$, and a generalized median operator according to $f(P_1,...,P_N) = Q_K$ for some fixed value K wherein $1 \leq K \leq N$.

14. (previously presented) A medical imaging system for reconstructing a three-dimensional dataset representative of an imaged object, said medical imaging system comprising:

a detector array;

at least one radiation source; and

a computer coupled to said detector array and radiation source and configured to:

acquire views of an object from at least two projection angles to generate projection data of the object;

backproject the views across an imaged volume to generate backprojected data; and

process the backprojected data using a non-linear operator to generate a three-dimensional dataset consisting of a plurality of medical images representative of the imaged object.

15. (original) A medical imaging system in accordance with Claim 14 wherein said detector array comprises at least one of a computed tomography (CT) detector array, a chest detector array, and a mammographic detector array.

16. (original) A medical imaging system in accordance with Claim 14 wherein to process the backprojected data using a non-linear operator, said computer further configured to process the backprojected data using a maximum operator.

17. (withdrawn) A medical imaging system in accordance with Claim 14 wherein to process the backprojected data using a non-linear operator, said computer further configured to process the backprojected data using a minimum operator.

18. (withdrawn) A medical imaging system in accordance with Claim 14 wherein to process the backprojected data using a non-linear operator, said computer further configured to process the backprojected data using a median operator according to $f(P_1,..., P_N) = median(P_1,..., P_N) = Q_{\frac{(N+1)}{2}}$.

19. (withdrawn) A medical imaging system in accordance with Claim 14 wherein to process the backprojected data using a non-linear operator, said computer further configured to process the backprojected data using a generalized median operator according to $f(P_1,..., P_N) = Q_K$ for some fixed value K wherein $1 \leq K \leq N$.

20. (withdrawn) A medical imaging system in accordance with Claim 14 wherein to process the backprojected data using a non-linear operator, said computer further configured to process the backprojected data using a generalized average operator.

21. (withdrawn) A medical imaging system in accordance with Claim 14 wherein to process the backprojected data using a non-linear operator, said computer further configured to process the backprojected data using a binary operator.

22. (withdrawn) A medical imaging system in accordance with Claim 14 wherein to process the backprojected data using a non-linear operator, said computer further configured to process the backprojected data using a monotonic operator.

23. (withdrawn) A medical imaging system in accordance with Claim 14, said computer further configured to enhance the generated three-dimensional dataset using unused contrast.

24. (withdrawn) A medical imaging system in accordance with Claim 10, wherein to enhance the generated three-dimensional dataset said computer further configured to perform a nonlinear reconstruction using enhanced views.

25. (withdrawn) A medical imaging system in accordance with Claim 24, wherein said computer further configured to compute enhanced views from the original views using unused contrast and a contribution count.

26. (previously presented) A medical imaging system for reconstructing a three-dimensional dataset representative of an imaged object, said medical imaging system comprising:

a detector array, said detector array comprising at least one of a computed tomography (CT) detector array, a chest detector array, and a mammographic detector array;

at least one radiation source; and

a computer coupled to said detector array and radiation source and configured to:

acquire views of an object from at least two projection angles to generate projection data of the object;

backproject the views across the imaged volume to generate backprojected data; and

process the backprojected data using a non-linear operator to generate a three-dimensional dataset consisting of a plurality of medical images representative of the imaged object, wherein said non-linear operator comprises one of a maximum operator, a minimum operator, a generalized average operator, a binary operator, a monotonic operator, a median operator according to $f(P_1,\ldots,P_N) = median(P_1,\ldots,P_N) = Q_{\frac{(N+1)}{2}}$, and a generalized median operator according to $f(P_1,\ldots,P_N) = Q_K$ for some fixed value K wherein $1 \leq K \leq N$.

27. (previously presented) A computer readable medium encoded with a program executable by a computer for reconstructing a three-dimensional dataset representative of an imaged object, said program configured to instruct the computer to:

acquire views of an object from at least two projection angles to generate projection data of the object;

backproject the views across an imaged volume to generate backprojected data; and

process the backprojected data using a non-linear operator to generate a three-dimensional dataset consisting of a plurality of medical images representative of the imaged object.

28. (original) A computer readable medium in accordance with Claim 27 wherein to acquire views of an object from at least two projection angles with a medical imaging system, said program further configured to acquire views of an object with at least one of a computed tomography (CT) detector array and a mammographic detector array.

29. (original) A computer readable medium in accordance with Claim 27 wherein to process the backprojected data using a non-linear operator, said program further configured to process the backprojected data using a maximum operator.

30. (withdrawn) A computer readable medium in accordance with Claim 27 wherein to process the backprojected data using a non-linear operator, said program further configured to process the backprojected data using a minimum operator.

31. (withdrawn) A computer readable medium in accordance with Claim 27 wherein to process the backprojected data using a non-linear operator, said program further configured to process the backprojected data using a median operator according to $f(P_1,...,P_N) = median(P_1,...,P_N) = Q_{\frac{(N+1)}{2}}$.

32. (withdrawn) A computer readable medium in accordance with Claim 27 wherein to process the backprojected data using a non-linear operator, said program further configured to process the backprojected data using a generalized median operator according to $f(P_1,...,P_N) = Q_K$ for some fixed value K wherein $1 \leq K \leq N$.

33. (withdrawn) A computer readable medium in accordance with Claim 27 wherein to process the backprojected data using a non-linear operator, said program further configured to process the backprojected data using a generalized average operator.

34. (withdrawn) A computer readable medium in accordance with Claim 27 wherein to process the backprojected data using a non-linear operator, said program further configured to process the backprojected data using a binary operator.

35. (withdrawn) A computer readable medium in accordance with Claim 27 wherein to process the backprojected data using a non-linear operator, said program further configured to process the backprojected data using a monotonic operator.

36. (withdrawn) A computer readable medium in accordance with Claim 27 wherein said program further configured to enhance the generated three-dimensional dataset using unused contrast.

37. (withdrawn) A computer readable medium in accordance with Claim 36, wherein to enhance the generated three-dimensional dataset said program further configured to perform a nonlinear reconstruction using enhanced views.

38. (withdrawn) A computer readable medium in accordance with Claim 37, wherein said program further configured to compute enhanced views from the original views using unused contrast and a contribution count.

39. (previously presented) A computer readable medium encoded with a program executable by a computer for reconstructing a three-dimensional radiographic image, said program configured to instruct the computer to:

acquire views of an object from at least two projection angles to generate projection data, said program further configured to acquire views of an object with at least one of a computed tomography (CT) detector array, chest detector array, and a mammographic detector array;

backproject the views across an imaged volume to generate backprojected data; and

process the backprojected data using a non-linear operator to generate a three-dimensional dataset consisting of a plurality of medical images representative of the imaged object, wherein said non-linear operator comprises one of a maximum operator, a minimum operator, an average operator, a binary operator, a monotonic operator, a median operator, wherein said median operator comprises $f(P_1,\ldots,P_N) = median(P_1,\ldots,P_N) = Q_{\frac{(N+1)}{2}}$, and a generalized median operator according to $f(P_1,\ldots,P_N) = Q_K$ for some fixed value K wherein $1 \leq K \leq N$.

9. APPENDIX OF EVIDENCE

None.

10. APPENDIX OF RELATED PROCEEDINGS

None.